

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-138306

(43)Date of publication of application : 27.05.1997

(51)Int.Cl.

G02B 5/20  
B41J 2/21  
G02F 1/1335

(21)Application number : 08-175189

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(22)Date of filing : 04.07.1996

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(30)Priority

Priority number : 07182560

Priority date : 19.07.1995

Priority country : JP

07190091

26.07.1995

07226443

04.09.1995

JP

07236781

14.09.1995

JP

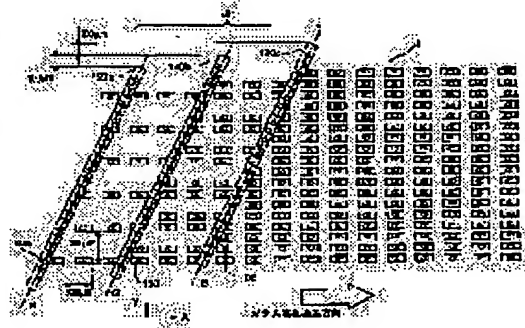
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(54) DEVICE AND METHOD FOR MANUFACTURING COLOR FILTER, INK JET DEVICE,  
COLOR FILTER, DISPLAY DEVICE AND DEVICE USING THE DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce the cost of a manufacturing device by using an ink jet head used for a general printer as it used when a color filter is manufactured.

SOLUTION: This ink jet device is provided with plural ink jet heads 120a, 120b, 120c having a first discharge nozzles group 108 setting gaps of plural ink discharge nozzles in the Y direction equally to the gaps of the pixel of the same color in the Y direction and a second discharge nozzles group setting the gaps equal to the pixel gaps in the Y direction in addition to the first discharge nozzles group, and only the nozzles group coloring the pixel of the corresponding to color on a substrate 1 between first second ink discharge nozzles group of plural ink jet heads is controlled for ink discharge operation.



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[Date of request for examination] 17.12.1997

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3111024

[Date of registration] 14.09.2000

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of said Y shaft orientations ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is provided. When used for the coloring said whose 1st regurgitation nozzle group is said pixel, said 2nd regurgitation nozzle group is not used for coloring of said pixel. Said control means The manufacturing installation of the color filter characterized by only the nozzle group which colors the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads and among the 2nd ink regurgitation nozzle group controlling ink discharging.

[Claim 2] Said control means is the manufacturing installation of the color filter according to claim 1 characterized by controlling to perform spare discharging before said two or more ink jet heads color the pixel of the color to which it corresponds on said substrate.

[Claim 3] Said control means is the manufacturing installation of the color filter according to claim 1 characterized by controlling only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads, and among the 2nd ink regurgitation nozzle group to perform spare discharging just before coloring.

[Claim 4] When said control means performs spare discharging just before coloring only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads, and among the 2nd ink regurgitation nozzle group, the case where spare discharging is performed by all nozzle groups also including the nozzle group which is not used for coloring just before coloring -- a case -- dividing -- carrying out -- carrying out -- as -- controlling -- things -- the description -- carrying out

-- being according to claim 1 -- a color filter -- a manufacturing installation.

[Claim 5] The manufacturing installation of the color filter according to claim 1 with which the number of nozzles of said 1st nozzle group and the other 2nd nozzle group is characterized by having an equal ink jet head.

[Claim 6] The color filter manufacturing installation according to claim 1 characterized by having the ink jet head with which said 1st nozzle group and the other 2nd nozzle group were arranged on the straight line.

[Claim 7] The manufacturing installation of the color filter according to claim 1 with which all the nozzles of said 1st nozzle group and the other 2nd nozzle group are characterized by having the ink jet head which set the same spacing as the direction of a nozzle train, and was arranged.

[Claim 8] Said ink jet head is the manufacturing installation of the color filter according to claim 1 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 9] Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacture approach of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of said Y shaft orientations ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. When used for the coloring said whose 1st regurgitation nozzle group is said pixel, said 2nd regurgitation nozzle group is not used for coloring of said pixel. Said control means Said 1st [ the ] of two or more of said ink jet heads, and the inside of the 2nd regurgitation nozzle group, It is that by which only the nozzle group colored the pixel of the color to which it corresponds on the substrate of light transmission nature controls ink discharging. The manufacture approach of the color filter characterized by making ink breathe out, making said X shaft orientations scan said ink jet head, and coloring the total of said pixel by the scan of said X shaft orientations of 1 time or multiple times.

[Claim 10] Said control means is the manufacture approach of the color filter according to claim 9 characterized by controlling to perform spare discharging before said two or more ink jet heads color it the pixel of the color to which it corresponds on said substrate.

[Claim 11] Said control means is the manufacture approach of the color filter according to claim 9 characterized by controlling only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads, and among the 2nd regurgitation nozzle group to perform spare discharging just before coloring.

[Claim 12] Just before said each ink jet head colors it the pixel of the color to which it corresponds on said substrate, said control means Only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads, and among the 2nd regurgitation nozzle

group by the case where reserve discharging is performed, and all the nozzle groups, in which the nozzle group which does not use it for coloring also included the case where spare discharging is performed -- a case -- dividing -- carrying out -- carrying out -- as -- controlling -- things -- the description -- carrying out -- being according to claim 9 -- a color filter -- the manufacture approach.

[Claim 13] Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order and forms many pixels colored a mutually different color. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of said Y shaft orientations ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. The color filter characterized by being manufactured by making ink breathe out, making X shaft orientations scan said ink jet head, and coloring the total of said pixel by the scan of X shaft orientations of 1 time or multiple times.

[Claim 14] Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is a display using the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of said Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of the direction of Y ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. The display characterized by equipping one with the color filter which was made to breathe out ink, making X shaft orientations scan said ink jet head, and colored the total of said pixel by the scan of X shaft orientations of 1 time or multiple times, and the quantity of light adjustable means which makes the quantity of light adjustable.

[Claim 15] Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. Used the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. It is equipment equipped with the display and they are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of said Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel

spacing of the direction of Y ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. The color filter which was made to breathe out ink, making X shaft orientations scan this ink jet head, and was colored by the scan of X shaft orientations of 1 time or multiple times in the total of said pixel, Equipment equipped with the display characterized by providing a picture signal supply means to supply a picture signal to the display which equips one with the quantity of light adjustable means which makes the quantity of light adjustable, and this display.

[Claim 16] It is ink jet equipment which colors it a covering color medium using the 2nd ink regurgitation nozzle group in which the regurgitation [ ink ] is possible instead of the 1st ink regurgitation nozzle group and said 1st ink regurgitation nozzle group. Spare ink discharging is made to perform only in said 1st ink regurgitation nozzle group before coloring of said covering color medium by said 1st ink regurgitation nozzle group. Ink jet equipment characterized by having the control means which makes spare ink discharging give the both sides of said 1st ink regurgitation nozzle group and the 2nd ink regurgitation nozzle group by frequency fewer than the frequency of ink discharging of the reserve by said 1st ink regurgitation nozzle group.

[Claim 17] The ink jet head which is the manufacturing installation of the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of said migration means and ink discharging of said ink jet head is provided. In case said ink jet head colors said substrate by the scan of multiple times, said control means The ink regurgitation nozzle used by next scan is the manufacturing installation of the color filter characterized by controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[Claim 18] Said ink jet head is the manufacturing installation of the color filter according to claim 17 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 19] Said control means is the manufacturing installation of the color filter according to claim 17 characterized by controlling to perform spare discharging before said ink jet head starts coloring to the pixel of the color to which it corresponds on the substrate of light transmission nature.

[Claim 20] Two or more ink jet heads which have two or more ink regurgitation nozzles which are the manufacturing installations of the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and were prepared for every color, respectively, The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is provided. In case said two or more ink jet heads color the whole region of said substrate by the scan of multiple times, said control means The ink regurgitation nozzle used by next scan is the manufacturing installation of the color filter characterized by controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[Claim 21] Said ink jet head is the manufacturing installation of the color filter according to claim 20 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 22] Said control means is the manufacturing installation of the color filter according to claim 20 characterized by controlling to perform spare discharging before said ink jet head starts coloring to the pixel of the color to which it corresponds on a substrate.

[Claim 23] On a substrate, put in order two or more pixels colored the color same to X shaft orientations which are one direction, and they are formed. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order two or more pixels colored a color which is different in a difference and forms them. Two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively, The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads is provided. In case said two or more ink jet heads color the whole region of said substrate by the scan of multiple times, said control means The ink regurgitation nozzle used by next scan is the manufacturing installation of the color filter characterized by controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[Claim 24] Said ink jet head is the manufacturing installation of the color filter according to claim 23 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 25] Said control means is the manufacturing installation of the color filter according to claim 7 characterized by controlling to perform spare discharging before said ink jet head starts coloring to the pixel of the color to which it corresponds on a substrate.

[Claim 26] On a substrate, put in order two or more pixels colored the color same to X shaft orientations which are one direction, and they are formed. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order two or more pixels colored a color which is different in a difference and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively. Two or more ink jet heads with pitch spacing of said Y shaft orientations of two or more of said ink regurgitation nozzles equal to pitch spacing of said Y shaft orientations of the pixel of the same color, The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads is provided. In case said two or more ink jet heads color the whole region of said substrate by the scan of multiple times, said control means The ink regurgitation nozzle used by next scan is the manufacturing installation of the color filter characterized by controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[Claim 27] Said ink jet head is the manufacturing installation of the color filter according to claim 26 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 28] Said control means is the manufacturing installation of the color filter according to claim 26 characterized by controlling to perform spare discharging before said ink jet head starts coloring to the pixel of the color to which it corresponds on a substrate.

[Claim 29] By controlling the relative position of the ink jet head and substrate which have two or more

ink regurgitation nozzles, and carrying out the regurgitation of the ink from said ink jet head to said substrate. It is the approach of manufacturing a color filter by putting in order two or more pixels colored on the substrate, and forming them. The ink regurgitation nozzle used by next scan in case said ink jet head colors the whole region of said substrate by the scan of multiple times is the manufacture approach of the color filter characterized by performing ink discharging so that it may become the ink regurgitation nozzle surely used by the pre-scan, or its part.

[Claim 30] Said ink jet head is the manufacture approach of the color filter according to claim 29 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 31] Said control means is the manufacture approach of the color filter according to claim 29 characterized by controlling to perform spare discharging before said ink jet head starts coloring to the pixel of the color to which it corresponds on a substrate.

[Claim 32] The ink jet head which is the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of this migration means and ink discharging of said ink jet head is used. The ink regurgitation nozzle used by next scan in case said ink jet head colors the whole region of said substrate by the scan of multiple times is a color filter characterized by coloring by ink discharging which serves as an ink regurgitation nozzle surely used by the pre-scan, or its part.

[Claim 33] The ink jet head which is an indicating equipment using the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads is used. In case said ink jet head colors the whole region of said substrate by the scan of multiple times The ink regurgitation nozzle used by next scan is a display characterized by equipping one with the color filter colored by ink discharging which serves as an ink regurgitation nozzle surely used by the pre-scan, or its part, and the quantity of light adjustable means which makes the quantity of light adjustable.

[Claim 34] The ink jet head which is the equipment equipped with the indicating equipment using the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads is used. In case said ink jet head colors the whole region of said substrate by the scan of multiple times The color filter colored by ink discharging from which the ink regurgitation nozzle used by next scan serves as an ink regurgitation nozzle surely used by the pre-scan, or its part, Equipment equipped with the display characterized by providing the display which equips one with the quantity of light adjustable means which makes the quantity of light adjustable, and a picture signal output means to output a picture signal to this display.

[Claim 35] An ink regurgitation means to be the manufacturing installation of the color filter manufactured by putting in order and forming many pixels colored on the substrate, and to have two or more ink regurgitation nozzles, The migration means for moving the relative position of said ink regurgitation means and said substrate, The control means which controls actuation of said migration



means and ink discharging of said ink regurgitation means is provided. Said control means The manufacturing installation of the color filter characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially, in case said ink regurgitation means colors said substrate by the scan of multiple times.

[Claim 36] Said ink regurgitation means is the manufacturing installation of the color filter according to claim 35 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 37] The volume of said ink breathed out is the manufacturing installation of the color filter according to claim 36 characterized by controlling by changing the driving pulse added to said heat energy generating object.

[Claim 38] Two or more ink regurgitation means to be the manufacturing installation of the color filter manufactured by putting in order and forming many pixels colored on the substrate, and for it to be prepared for every color and to have two or more ink regurgitation nozzles, respectively, The migration means for moving the relative position of said two or more ink regurgitation means and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink regurgitation means is provided. Said control means The manufacturing installation of the color filter characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially, in case said two or more ink regurgitation means color the whole region of said substrate by the scan of multiple times.

[Claim 39] Said ink regurgitation means is the manufacturing installation of the color filter according to claim 38 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 40] The volume of said ink breathed out is the manufacturing installation of the color filter according to claim 39 characterized by controlling by changing the driving pulse added to said heat energy generating object.

[Claim 41] Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order and forms many pixels colored a mutually different color. Two or more ink regurgitation means to have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively, The migration means for moving the relative position of said two or more ink regurgitation means and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink regurgitation means is provided. Said control means The manufacturing installation of the color filter characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially, in case said two or more ink regurgitation means color the whole region of said substrate by the scan of multiple times.

[Claim 42] Said ink regurgitation means is the manufacturing installation of the color filter according to claim 41 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 43] The volume of said ink breathed out is the manufacturing installation of the color filter according to claim 42 characterized by controlling by changing the driving pulse added to said heat

energy generating object.

[Claim 44] Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order and forms many pixels colored a mutually different color. They are two or more ink regurgitation means to have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively. Two or more regurgitation means by which it had the nozzle train arranged so that pitch spacing of Y shaft orientations of two or more of said ink regurgitation nozzles might become equal to pitch spacing of Y shaft orientations of the pixel of the same color at least, The migration means for moving the relative position of said two or more ink regurgitation means and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink regurgitation means is provided. Said control means The manufacturing installation of the color filter characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially, in case said two or more ink regurgitation means color the whole region of said substrate by the scan of multiple times.

[Claim 45] Said ink regurgitation means is the manufacturing installation of the color filter according to claim 44 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 46] The volume of said ink breathed out is the manufacturing installation of the color filter according to claim 45 characterized by controlling by changing the driving pulse added to said heat energy generating object.

[Claim 47] The manufacture approach of the color filter characterized by to color by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan in case the scan of the multiple times which move the relative position of an ink regurgitation means are the manufacture approach of the color filter manufactured by putting in order and forming many pixels colored on the substrate, and have two or more ink regurgitation nozzles, and said substrate colors the whole region of said substrate.

[Claim 48] The color filter characterized by coloring by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan when the scan of the multiple times which move the relative position of an ink regurgitation means to be the color filter manufactured by putting in order and forming many pixels colored on the substrate, and to have two or more ink regurgitation nozzles, and said substrate colors the whole region of said substrate.

[Claim 49] It is a display using the color filter manufactured by putting in order and forming many pixels colored on the substrate. In case the scan of the multiple times which move the relative position of an ink regurgitation means to have two or more ink regurgitation nozzles, and said substrate colors the whole region of said substrate The color filter which colored by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan, and the display characterized by equipping one with the quantity of light adjustable means which makes the quantity of light adjustable.

[Claim 50] Used the color filter manufactured by putting in order and forming many pixels colored on the substrate. In case the scan of the multiple times which move the relative position of an ink regurgitation means to be equipment equipped with the display and to have two or more ink regurgitation nozzles, and said substrate colors the whole region of said substrate The color filter which colored by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan, Equipment equipped with the

display characterized by providing the display which equips one with the quantity of light adjustable means which makes the quantity of light adjustable, and a picture signal output means to output a picture signal to this display.

[Claim 51] All the nozzles of the ink jet head which has two or more ink regurgitation nozzles are divided into two or more nozzle groups for every predetermined number. The change process for being the manufacture approach of a color filter of changing these two or more nozzle groups if needed, and coloring each pixel of discharge and a color filter a substrate for ink, and changing said two or more nozzle groups, The manufacture approach of the color filter characterized by providing the compensation process which compensates the location gap with the this used nozzle group and said each pixel when the nozzle group used according to said change process is changed.

[Claim 52] Said change process is the manufacture approach of the color filter according to claim 51 characterized by having the process which detects or presumes the poor regurgitation of the nozzle group which is carrying out current use, and the process which changes said two or more nozzle groups based on this detection or a presumed result.

[Claim 53] Said change process is the manufacture approach of the color filter according to claim 51 characterized by having the process which detects the temperature of two or more of said nozzle groups, and the process which changes said two or more nozzle groups based on the detection result in this detection process.

[Claim 54] Said ink jet head is the manufacture approach of the color filter according to claim 51 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

[Claim 55] All the nozzles of the ink jet head which has two or more ink regurgitation nozzles are divided into two or more nozzle groups for every predetermined number. The change means for being the manufacturing installation of a color filter which changes these two or more nozzle groups if needed, and colors each pixel of discharge and a color filter a substrate for ink, and changing said two or more nozzle groups, The manufacturing installation of the color filter characterized by providing a compensation means to compensate the location gap with the this used nozzle group and said each pixel when the nozzle group used with the control means which controls change actuation of this change means, and said change means is changed.

[Claim 56] Said control means is the manufacturing installation of the color filter according to claim 55 characterized by detecting or presuming the poor regurgitation of the nozzle group which is carrying out current use, and changing said two or more nozzle groups based on this detection or a presumed result.

[Claim 57] Said control means is the manufacturing installation of the color filter according to claim 55 characterized by detecting the temperature of two or more of said nozzle groups, and changing said two or more nozzle groups based on this detection result.

[Claim 58] Said ink jet head is the manufacturing installation of the color filter according to claim 55 characterized by having the heat energy generating object for being the head which carries out the regurgitation of the ink using heat energy, and generating the heat energy given to ink.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to equipment equipped with the manufacturing installation, the manufacture approach, the ink jet equipment, the color filter, the display, and this display of the color filter manufactured by forming many pixels colored two or more kinds of colors on the substrate of light transmission nature.

[0002]

[Description of the Prior Art] In recent years, it is in a liquid crystal display and the inclination which the need of a color liquid crystal display especially increases with development of a personal computer, especially development of a portable personal computer. However, for the further spread, the cost cut of a liquid crystal display is required, and the demand to the cost cut of a color filter with specific gravity high in cost is increasing especially. Although various approaches are tried and are from the former in order to meet the above-mentioned demand, satisfying the demand characteristics of a color filter, the method of still satisfying all demand characteristics is not established. Each approach is explained below.

[0003] The 1st approach is a staining technique. After a staining technique applies the water soluble polymer ingredient which is an ingredient for dyeing on a glass substrate and carries out patterning of this to a desired configuration according to a photolithography process, it obtains the pattern which was immersed in the dyeing bath in the obtained pattern, and was colored. The color filter layer of R, G, and B is obtained by repeating this 3 times.

[0004] The 2nd approach is a pigment-content powder method, and is replaced with a staining technique in recent years. This approach forms on a substrate the photopolymer layer which distributed the pigment, and obtains a monochromatic pattern by carrying out patterning of this. By furthermore repeating this process 3 times, the color filter layer of R, G, and B is formed.

[0005] There is an electrodeposition process as the 3rd approach. This approach is immersed in the electropainting liquid which carried out patterning of the transparent electrode on the substrate, and entered [ electrolytic solution / a pigment, resin, ], and electrodeposits the 1st color. After repeating this process 3 times and distinguishing R, G, and B by different color with, a color specification layer is formed by carrying out heat curing of the resin.

[0006] There are print processes as the 4th approach. This approach makes the resin of a heat-curing mold distribute a pigment, and after it distinguishes R, G, and B by different color with by repeating printing 3 times, it forms a coloring layer by carrying out heat curing of the resin. Moreover, it is common

to form a protective layer on a coloring layer also in which approach.

[0007] The point common to these approaches is repeating the same process 3 times, in order to color three colors of R, G, and B, and becoming cost quantity. Moreover, it has the trouble that the yield falls, so that there are many processes. Furthermore, in an electrodeposition process, since the pattern configuration which can be formed is limited, with the present technique, it is inapplicable to the color liquid crystal display of a TFT method. Moreover, since definition and smooth nature of print processes are bad, the pattern of a fine pitch cannot be formed.

[0008] The method of manufacturing a color filter using an ink jet method is indicated by JP,59-75205,A, JP,63-235901,A, JP,63-294503,A, or JP,1-217320,A in order to compensate these faults.

[0009] Approaches, such as preparing a light-shielding film so that it may have opening which has predetermined regularity on a transparence substrate as an approach of creating a color filter by the ink jet method, and coloring it this opening by breathing out ink from an ink jet head in it, are indicated.

[0010] Generally development of an ink jet head takes very many time amount and costs. Therefore, since there is little head number produced as compared with the ink jet head used by the printer currently generally used even if it develops the ink jet head of dedication for the manufacturing installation of a color filter, it will become very expensive, and a manufacturing installation large-sum-izes and leads to the cost rise of a color filter.

[0011] Moreover, when it is going to apply the ink jet head used by the common printer to manufacture of a color filter, the resolution of the existing ink jet head for almost all printers is 300dpi, 360dpi, 400dpi, 600dpi, or 720dpi. On the other hand, the pixel pitch of a color filter by the 9.4 inches VGA type An XGA type (300 micrometers (an equivalent for 84.7dpi), and 10.4 inches), By the 12.9 inches EWS type, an XGA type (207 micrometers (an equivalent for 122.7dpi), and 12.1 inches), and a 13.8 inches EWS type, Even if it is 240 etc. micrometers (an equivalent for 105.8dpi) etc. and is the case of which combination by the 15.5 inches EWS type, the resolving power of an ink jet head and the pixel pitch of a color filter are in agreement, or there is no combination which becomes an integral multiple. Moreover, when the resolving power of an ink jet head and the pixel pitch of a color filter are in agreement even when it corresponds to color filters other than these, or becoming an integral multiple, it is thought that there is almost nothing.

[0012] Then, the applicant for this patent examined arranging an ink jet head aslant to a color filter substrate, and doubling and using a pixel pitch, in order to double the resolving power of an ink jet head, and the pixel pitch of a color filter, in case the ink jet head used by the printer of a general ink jet method etc. is applied to the manufacturing installation of a color filter.

[0013] Moreover, it considered attaching an ink jet head in a manufacturing installation to a color filter substrate, so that it can carry out adjustable [ of the include angle ] so that it could respond to the pixel pitch of various color filters with one kind of ink jet head.

[0014] However, an ink jet head is aslant arranged to a color filter substrate in this way, and in case it colors by making an ink jet head and a color filter substrate scan relatively, the need that an ink jet head scans too many only a part to be arranged aslant relatively is made. Since the relative scan of multiple times was needed when this increased the coloring time amount which per substrate takes and an ink jet head shorter than the effective pixel area of a color filter was used especially, it turned out that there is a problem of taking time amount increasingly. That the time amount per substrate cuts in many will lower the volume of the color filter per unit time amount, and it leads also to the cost rise of a color filter simple substance.

[0015] Moreover, since there is a possibility may produce phenomena, such as non-regurgitation which does not carry out the regurgitation of the ink, and a kink to which the discharge direction of ink inclines, when the ink-jet head was left, and the ink in the regurgitation nozzle of an ink jet head tends to touch air, and tends to thicken, or tends to fix and you try to make it breathe out ink by the case where an ink jet head is used, when not using a head, the nozzle side is covered by the cap member. Under the effect of the thickened ink, the regurgitation of several shots of the beginning is not carried out, or they still produce a kink at the beginning of discharge. If the regurgitation is performed to printed media, such as paper, in this condition, since a part of alphabetic character will be fallen out or crushed, deterioration of printing grace will be caused. In order to prevent this phenomenon, before performing actual printing, the receptacle section which receives the ink produced in the reserve regurgitation into the part of the cap section or others is prepared, and how many shots operate the ink regurgitation (reserve regurgitation) of that reserve there. This actuation itself is generally carried out by the printer of an ink jet method, and it is not special actuation.

[0016] Since it is the approach of coloring it opening with predetermined regularity by breathing out ink from an ink jet head as mentioned above unlike the case of the usual printer, the case where an ink jet head is used for the manufacturing installation of a color filter requires a value high a figure single [ about ] as compared with the case of a printer with a common impact precision of ink. Therefore, it is more desirable to surely operate the reserve regurgitation, before becoming much more important [ actuation of the reserve regurgitation ], breathing out ink to a glass substrate and coloring a color pattern.

[0017] furthermore, when the long picture head which can color all glass substrates by one scan after actuation of this reserve regurgitation is used Although it does not become a problem, when a head with short die length which colors one glass substrate by the scan of multiple times is used If the time amount which stops the regurgitation of a head is needed and this time amount becomes long, in order to change the relative position of a head and a substrate between scans, when carrying out the regurgitation by the next scan, there are non-regurgitation and a possibility of producing a kink.

[0018] Moreover, when coloring the whole surface by the scan of multiple times, the always same nozzle is not necessarily used by one scan at a scan at each time due to the number of pixels which constitutes the number of usable regurgitation nozzles, and a color filter. Therefore, the nozzle which was not used by pre-scan may be used.

[0019] Since the nozzle which was not used by pre-scan has the long time amount which is touching air without being used naturally as compared with other nozzles When possibility of producing phenomena, such as non-regurgitation which does not carry out the regurgitation of the ink when the ink in a regurgitation nozzle tends to thicken, or it is going to fix and you try to make it breathing out ink, and a kink to which the discharge direction of ink inclines, becomes high and it sees as a color filter, there is a possibility of becoming poor.

[0020] Moreover, although it is also possible to move a head relatively [ section / of the reserve regurgitation of other parts / the cap section or / ink receptacle ], and to perform spare discharging whenever it performs one scan in order to prevent this Therefore, since time amount until it finishes coloring one substrate became long, the volume per unit time amount fell and it led to a cost rise, the applicant for this patent found out that it was not a desirable approach.

[0021] Moreover, there are also the following troubles apart from the above-mentioned problem.

[0022] In order to double the resolving power of an ink jet head, and the pixel pitch of a color filter here in case the ink jet head used by the printer of a general ink jet method etc. is applied to the manufacturing installation of a color filter before describing a trouble concretely, an ink jet head is aslant arranged to a color filter substrate, and an example which the applicant for this patent in the case of doubling and using a pixel pitch examined is explained with reference to drawing 1.

[0023] Drawing 1 is drawing which looked at signs that the ink jet head was coloring the pixel of a color filter, from the top, and shows only the location of a nozzle train about the ink jet head. Moreover, a situation when coloring the part which should be colored red among the decided patterns is shown. In addition, the alphabetic character of R, G, and B which are drawn on each pixel in drawing 1 shows that each pixel is colored red (R), green (G), and blue (B).

[0024] 1013 is the nozzle train formed in the ink jet head, ink is breathed out from here and an ink dot is formed on a substrate. 1014 is the pixel of a color filter and is a part in which the ink dot on a substrate is formed.

[0025] In the example of drawing 1, since spacing of the pixel of a color filter and nozzle spacing of an ink jet head are not in agreement, the inside of a pixel is colored by forming an ink dot into a pixel 1014, leaning a head, making in agreement the location of the pixel of the same color located in a line in the direction of Y every three, and the location of the ink breathed out from the nozzle in every five pieces, and moving an ink jet head relatively [ direction / of X / in drawing ]. A color filter is manufactured by performing this with red, green, and the ink jet head that carries out the regurgitation of the ink of each blue. For this reason, with the ink jet head for coloring the red pixel shown in this drawing, it counts from the lower right, the 2nd, the 7th, and the 12th nozzle perform the regurgitation, and the regurgitation of other nozzles is not carried out.

[0026] In addition, in this example, the head of the general ink jet method of nozzle pitch 360dpi (70.5 micrometers) is used as an ink jet head. Moreover, the thing with a spacing [ between pixels ] of 100 micrometers is shown as a color filter.

[0027] There are the following properties in the head of an ink jet method at this time.

(1) When getting a nozzle blocked with the solid which exists in ink, the regurgitation may not be carried out normally. Under the present circumstances, if a nozzle in use will not carry out the regurgitation normally, the whole ink jet head will be exchanged.

(2) By especially the ink jet method using heat developing, when the regurgitation of a fixed number of ink is carried out, a nozzle has the property which will not carry out the regurgitation normally, namely, the life of a nozzle is dependent on the number of regurgitation ink with a burn of ink etc. For this reason, it is required to perform exchange of an ink jet head periodically:

(3) By the ink jet method using heat developing, since the heater formed in the nozzle which is carrying out the regurgitation generates heat, the temperature near [ which is breathed out ] the nozzle rises by repeating the regurgitation. The amount of the ink breathed out on the other hand is dependent on temperature. For this reason, while the magnitude of an ink dot changes gradually, an ink jet head expands and deformation of a nozzle pitch changing takes place.

[0028] Thus, in the manufacturing installation of a color filter, when using only a specific nozzle, there are the following troubles.

(1) Although other nozzles are usable when the nozzle which does not carry out the regurgitation normally occurs, it is necessary to exchange the whole ink jet head.



(2) Especially by the ink jet method using heat developing, in order that the life of a nozzle may be dependent on the number of regurgitation ink, periodical head exchange is required, and in case it is this exchange, although the nozzle of other large majorities is usable, the life of some nozzles which were being used turns into a life of the whole ink jet head.

(3) Especially by the ink jet method using heat developing, in connection with the regurgitation, the temperature near the nozzle rises and change discharge quantity in connection with it. For this reason, the magnitude of an ink dot and the thickness of a color which are formed in a substrate change, and it has a bad influence on the homogeneity of a color filter.

[0029] Furthermore, there are also the following troubles. That is, the impurity generated from the color material contained in ink is eluted in a liquid crystal layer etc., since there is a possibility of causing deterioration of display grace, it is necessary to refine to altitude the ink used for a color filter, and it needs to remove an impurity. Therefore, ink is expensive and reduction of the amount of the ink used is strongly desired from the field of cost.

[0030] Therefore, it is offering the manufacturing installation and the manufacture approach of a color filter which can make cheaper cost which lowers the cost of an ink jet head and starts a manufacturing installation by making this invention in view of the technical problem mentioned above, using for the purpose what is used for the common printer in the ink jet head used in case a color filter is manufactured, or carrying out easy reconstruction and using.

[0031] Moreover, other purposes of this invention reduce the amount of the ink for color filters used for per sheet, and are offering equipment equipped with a cheaper color filter, the display using this color filter, and this display.

[0032] Moreover, the purpose of further others of this invention is set when the scan of multiple times colors one glass substrate. By shortening the drawing time amount which discharging of an ink jet head is stabilized, and can lessen a defect's generating, and one glass substrate takes, and increasing the volume per unit time amount It is offering equipment equipped with the manufacturing installation, the manufacture approach, the color filter, the display, and this display of the color filter which can produce the color filter of low cost.

[0033] Moreover, the purpose of further others of this invention is offering the manufacturing installation of a color filter whose yield's set the ink jet head arranged so that a regurgitation nozzle's might be in agreement with a pixel pitch when one substrate's was drawn by the relative scan of multiple times, and shortened the quiescent time to which the regurgitation nozzle of the ink jet head between scans does not carry out the regurgitation of the ink, stabilized discharging of an ink jet head, lessened a defect's generating, and improved.

[0034] Moreover, the purpose of further others of this invention is changing the nozzle to be used to other nozzles of the same ink jet head.

[0035] Moreover, the purpose of further others of this invention is decreasing the exchange frequency of the ink jet head by the life of a nozzle.

[0036] Moreover, the purpose of further others of this invention is keeping the magnitude of an ink dot, and the thickness of a color constant.

[0037]

[Means for Solving the Problem] In order to solve the technical problem mentioned above and to attain the purpose, the manufacturing installation of the color filter concerning this invention Many pixels



colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of said Y shaft orientations ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is provided. When used for the coloring said whose 1st regurgitation nozzle group is said pixel, said 2nd regurgitation nozzle group is not used for coloring of said pixel. Said control means It is characterized by only the nozzle group which colors the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads and among the 2nd ink regurgitation nozzle group controlling ink discharging.

[0038] Moreover, in the manufacturing installation of the color filter concerning this invention, said control means is characterized by controlling to perform spare discharging, before said two or more ink jet heads color the pixel of the color to which it corresponds on said substrate.

[0039] Moreover, in the manufacturing installation of the color filter concerning this invention, said control means is characterized by controlling only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads, and among the 2nd ink regurgitation nozzle group to perform spare discharging, just before coloring.

[0040] In the manufacturing installation of the color filter concerning this invention moreover, said control means When only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads and among the 2nd ink regurgitation nozzle group performs spare discharging just before coloring, the case where spare discharging is performed by all nozzle groups also including the nozzle group which is not used for coloring just before coloring -- a case -- dividing -- carrying out -- carrying out -- as -- controlling -- things -- the description -- carrying out -- \*\*\*\*.

[0041] Moreover, in the manufacturing installation of the color filter concerning this invention, the number of nozzles of said 1st nozzle group and the other 2nd nozzle group is characterized by having an equal ink jet head.

[0042] Moreover, in the manufacturing installation of the color filter concerning this invention, it is characterized by having the ink jet head with which said 1st nozzle group and the other 2nd nozzle group were arranged on the straight line.

[0043] Moreover, in the manufacturing installation of the color filter concerning this invention, all the nozzles of said 1st nozzle group and the other 2nd nozzle group are characterized by having the ink jet head which set the same spacing as the direction of a nozzle train, and was arranged.

[0044] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink jet head is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0045] Moreover, the manufacture approach of the color filter concerning this invention Many pixels

colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacture approach of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of said Y shaft orientations ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. When used for the coloring said whose 1st regurgitation nozzle group is said pixel, said 2nd regurgitation nozzle group is not used for coloring of said pixel. Said control means Said 1st [ the ] of two or more of said ink jet heads, and the inside of the 2nd regurgitation nozzle group, It is that by which only the nozzle group colored the pixel of the color to which it corresponds on the substrate of light transmission nature controls ink discharging. Ink is made to breathe out, making said X shaft orientations scan said ink jet head, and it is characterized by coloring the total of said pixel by the scan of said X shaft orientations of 1 time or multiple times.

[0046] Moreover, in the manufacture approach of the color filter concerning this invention, said control means is characterized by controlling to perform spare discharging, before said two or more ink jet heads color it the pixel of the color to which it corresponds on said substrate.

[0047] Moreover, in the manufacture approach of the color filter concerning this invention, said control means is characterized by controlling only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads, and among the 2nd regurgitation nozzle group to perform spare discharging, just before coloring.

[0048] In the manufacture approach of the color filter concerning this invention moreover, said control means Just before said each ink jet head colors it the pixel of the color to which it corresponds on said substrate Only the nozzle group colored the pixel of the color to which it corresponds on said substrate the 1st of two or more of said ink jet heads, and among the 2nd regurgitation nozzle group by the case where reserve discharging is performed, and all the nozzle groups, in which the nozzle group which does not use it for coloring also included the case where spare discharging is performed -- a case -- dividing -- carrying out -- carrying out -- as -- controlling -- things -- the description -- carrying out -- \*\*\*\* .

[0049] Moreover, the color filter concerning this invention puts in order and forms on a substrate many pixels colored the color same to X shaft orientations which are one direction. It is the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order and forms many pixels colored a mutually different color. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of said Y shaft orientations ] in addition to the 1st regurgitation nozzle group The migration means for moving the

relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. Ink is made to breathe out, making X shaft orientations scan said ink jet head, and it is characterized by being manufactured by coloring the total of said pixel by the scan of X shaft orientations of 1 time or multiple times.

[0050] Moreover, the display concerning this invention puts in order and forms on a substrate many pixels colored the color same to X shaft orientations which are one direction. It is a display using the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of said Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of the direction of Y ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. Ink is made to breathe out, making X shaft orientations scan said ink jet head, and it is characterized by equipping one with the color filter which colored the total of said pixel by the scan of X shaft orientations of 1 time or multiple times, and the quantity of light adjustable means which makes the quantity of light adjustable.

[0051] Moreover, equipment equipped with the display concerning this invention Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. Used the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order periodically many pixels colored a mutually different color and forms them. It is equipment equipped with the display and they are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with said Y shaft orientations, respectively. The 1st regurgitation nozzle group to which spacing of said Y shaft orientations of two or more of said ink regurgitation nozzles was set equally to spacing of Y shaft orientations of the pixel of the same color, this -- with two or more ink jet heads which have the 2nd regurgitation nozzle group set up equally [ to pixel spacing of the direction of Y ] in addition to the 1st regurgitation nozzle group The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is used. The color filter which was made to breathe out ink, making X shaft orientations scan this ink jet head, and was colored by the scan of X shaft orientations of 1 time or multiple times in the total of said pixel, It is characterized by providing the display which equips one with the quantity of light adjustable means which makes the quantity of light adjustable, and a picture signal supply means to supply a picture signal to this display.

[0052] Moreover, the ink jet equipment concerning this invention It is ink jet equipment which colors it a covering color medium using the 2nd ink regurgitation nozzle group in which the regurgitation [ ink ] is possible instead of the 1st ink regurgitation nozzle group and said 1st ink regurgitation nozzle group. Spare ink discharging is made to perform only in said 1st ink regurgitation nozzle group before coloring of

said covering color medium by said 1st ink regurgitation nozzle group. It is characterized by having the control means which makes spare ink discharging give the both sides of said 1st ink regurgitation nozzle group and the 2nd ink regurgitation nozzle group by frequency fewer than the frequency of ink discharging of the reserve by said 1st ink regurgitation nozzle group.

[0053] Moreover, the manufacturing installation of the color filter concerning this invention The ink jet head which is the manufacturing installation of the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of said migration means and ink discharging of said ink jet head is provided. In case said ink jet head colors said substrate by the scan of multiple times, it is characterized by the ink regurgitation nozzle which uses said control means by next scan controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[0054] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink jet head is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0055] Moreover, in the manufacturing installation of the color filter concerning this invention, said control means is characterized by controlling to perform spare discharging, before said ink jet head starts coloring to the pixel of the color to which it corresponds on the substrate of light transmission nature.

[0056] Moreover, the manufacturing installation of the color filter concerning this invention Two or more ink jet heads which have two or more ink regurgitation nozzles which are the manufacturing installations of the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and were prepared for every color, respectively, The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink jet heads is provided. In case said two or more ink jet heads color the whole region of said substrate by the scan of multiple times, said control means It is characterized by the ink regurgitation nozzle used by next scan controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[0057] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink jet head is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0058] Moreover, in the manufacturing installation of the color filter concerning this invention, said control means is characterized by controlling to perform spare discharging, before said ink jet head starts coloring to the pixel of the color to which it corresponds on a substrate.

[0059] Moreover, the manufacturing installation of the color filter concerning this invention On a substrate, put in order two or more pixels colored the color same to X shaft orientations which are one direction, and they are formed. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order two or more pixels colored a color which is different in a difference and forms them. Two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively, The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads

is provided. In case said two or more ink jet heads color the whole region of said substrate by the scan of multiple times, said control means It is characterized by the ink regurgitation nozzle used by next scan controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[0060] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink jet head is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0061] Moreover, in the manufacturing installation of the color filter concerning this invention, said control means is characterized by controlling to perform spare discharging, before said ink jet head starts coloring to the pixel of the color to which it corresponds on a substrate.

[0062] Moreover, the manufacturing installation of the color filter concerning this invention On a substrate, put in order two or more pixels colored the color same to X shaft orientations which are one direction, and they are formed. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order two or more pixels colored a color which is different in a difference and forms them. They are two or more ink jet heads which have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively. Two or more ink jet heads with pitch spacing of said Y shaft orientations of two or more of said ink regurgitation nozzles equal to pitch spacing of said Y shaft orientations of the pixel of the same color, The migration means for moving the relative position of these two or more ink jet heads and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads is provided. In case said two or more ink jet heads color the whole region of said substrate by the scan of multiple times, said control means It is characterized by the ink regurgitation nozzle used by next scan controlling ink discharging to be the ink regurgitation nozzle surely used by the pre- scan, or its part.

[0063] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink jet head is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0064] Moreover, in the manufacturing installation of the color filter concerning this invention, said control means is characterized by controlling to perform spare discharging, before said ink jet head starts coloring to the pixel of the color to which it corresponds on a substrate.

[0065] Moreover, the manufacture approach of the color filter concerning this invention By controlling the relative position of the ink jet head and substrate which have two or more ink regurgitation nozzles, and carrying out the regurgitation of the ink from said ink jet head to said substrate It is the approach of manufacturing a color filter by putting in order two or more pixels colored on the substrate, and forming them. In case said ink jet head colors the whole region of said substrate by the scan of multiple times, the ink regurgitation nozzle used by next scan is characterized by performing ink discharging so that it may become the ink regurgitation nozzle surely used by the pre- scan, or its part.

[0066] Moreover, it is the manufacture approach of the color filter according to claim 29 characterized by being the head to which said ink jet head carries out the regurgitation of the ink in the manufacture approach of the color filter concerning this invention using heat energy, and having the heat energy generating object for generating the heat energy given to ink.

[0067] Moreover, in the manufacture approach of the color filter concerning this invention, said control means is characterized by controlling to perform spare discharging, before said ink jet head starts

coloring to the pixel of the color to which it corresponds on a substrate.

[0068] Moreover, the ink jet head which the color filter concerning this invention is a color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of this migration means and ink discharging of said ink jet head is used. In case said ink jet head colors the whole region of said substrate by the scan of multiple times, it is characterized by coloring the ink regurgitation nozzle used by next scan by ink discharging which serves as an ink regurgitation nozzle surely used by the pre- scan, or its part.

[0069] Moreover, the ink jet head which the display concerning this invention is a display using the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads is used. In case said ink jet head colors the whole region of said substrate by the scan of multiple times, It is characterized by the ink regurgitation nozzle used by next scan equipping one with the color filter colored by ink discharging which serves as an ink regurgitation nozzle surely used by the pre- scan, or its part, and the quantity of light adjustable means which makes the quantity of light adjustable.

[0070] Moreover, equipment equipped with the display concerning this invention The ink jet head which is the equipment equipped with the indicating equipment using the color filter manufactured by putting in order two or more pixels colored on the substrate, and forming them, and has two or more ink regurgitation nozzles, The migration means for moving the relative position of this ink jet head and said substrate, The control means which controls actuation of this migration means and ink discharging of two or more of said ink jet heads is used. In case said ink jet head colors the whole region of said substrate by the scan of multiple times The color filter colored by ink discharging from which the ink regurgitation nozzle used by next scan serves as an ink regurgitation nozzle surely used by the pre- scan, or its part, It is characterized by providing the display which equips one with the quantity of light adjustable means which makes the quantity of light adjustable, and a picture signal output means to output a picture signal to this display.

[0071] Moreover, the manufacturing installation of the color filter concerning this invention An ink regurgitation means to be the manufacturing installation of the color filter manufactured by putting in order and forming many pixels colored on the substrate, and to have two or more ink regurgitation nozzles, The migration means for moving the relative position of said ink regurgitation means and said substrate, The control means which controls actuation of said migration means and ink discharging of said ink regurgitation means is provided. Said control means In case said ink regurgitation means colors said substrate by the scan of multiple times, it is characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially.

[0072] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink regurgitation means is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0073] Moreover, in the manufacturing installation of the color filter concerning this invention, the volume of said ink breathed out is characterized by controlling by changing the driving pulse added to



said heat energy generating object.

[0074] Moreover, the manufacturing installation of the color filter concerning this invention Two or more ink regurgitation means to be the manufacturing installation of the color filter manufactured by putting in order and forming many pixels colored on the substrate, and for it to be prepared for every color and to have two or more ink regurgitation nozzles, respectively, The migration means for moving the relative position of said two or more ink regurgitation means and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink regurgitation means is provided. Said control means In case said two or more ink regurgitation means color the whole region of said substrate by the scan of multiple times, it is characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially.

[0075] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink regurgitation means is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0076] Moreover, in the manufacturing installation of the color filter concerning this invention, the volume of said ink breathed out is characterized by controlling by changing the driving pulse added to said heat energy generating object.

[0077] Moreover, the manufacturing installation of the color filter concerning this invention Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order and forms many pixels colored a mutually different color. Two or more ink regurgitation means to have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively, The migration means for moving the relative position of said two or more ink regurgitation means and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink regurgitation means is provided. Said control means In case said two or more ink regurgitation means color the whole region of said substrate by the scan of multiple times, it is characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially.

[0078] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink regurgitation means is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0079] Moreover, in the manufacturing installation of the color filter concerning this invention, the volume of said ink breathed out is characterized by controlling by changing the driving pulse added to said heat energy generating object.

[0080] Moreover, the manufacturing installation of the color filter concerning this invention Many pixels colored the color same to X shaft orientations which are one direction are put in order and formed on a substrate. It is the manufacturing installation of the color filter manufactured when the pixel which adjoins Y shaft orientations which intersect perpendicularly with said X shaft orientations puts in order and forms many pixels colored a mutually different color. They are two or more ink regurgitation means to have two or more ink regurgitation nozzles which were prepared for every color and located in a line with Y shaft orientations, respectively. Two or more regurgitation means by which it had the nozzle train arranged so that pitch spacing of Y shaft orientations of two or more of said ink regurgitation nozzles

might become equal to pitch spacing of Y shaft orientations of the pixel of the same color at least, The migration means for moving the relative position of said two or more ink regurgitation means and said substrate, The control means which controls actuation of said migration means and ink discharging of two or more of said ink regurgitation means is provided. Said control means In case said two or more ink regurgitation means color the whole region of said substrate by the scan of multiple times, it is characterized by controlling so that the number of nozzles used for coloring by each scan becomes equal substantially.

[0081] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink regurgitation means is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0082] Moreover, in the manufacturing installation of the color filter concerning this invention, the volume of said ink breathed out is characterized by controlling by changing the driving pulse added to said heat energy generating object.

[0083] Moreover, the manufacture approach of the color filter concerning this invention It is the manufacture approach of the color filter manufactured by putting in order and forming many pixels colored on the substrate. In case the scan of the multiple times which move the relative position of an ink regurgitation means to have two or more ink regurgitation nozzles, and said substrate colors the whole region of said substrate, it is characterized by coloring by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan.

[0084] Moreover, the color filter concerning this invention is a color filter manufactured by putting in order and forming many pixels colored on the substrate, and in case it colors the whole region of said substrate by the scan of the multiple times which move the relative position of an ink regurgitation means have two or more ink regurgitation nozzles, and said substrate, it is characterized by to color by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan.

[0085] Moreover, the display concerning this invention is a display using the color filter manufactured by putting in order and forming many pixels colored on the substrate. In case the scan of the multiple times which move the relative position of an ink regurgitation means to have two or more ink regurgitation nozzles, and said substrate colors the whole region of said substrate It is characterized by equipping one with the color filter which colored by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan, and the quantity of light adjustable means which makes the quantity of light adjustable.

[0086] Moreover, equipment equipped with the display concerning this invention Used the color filter manufactured by putting in order and forming many pixels colored on the substrate. In case the scan of the multiple times which move the relative position of an ink regurgitation means to be equipment equipped with the display and to have two or more ink regurgitation nozzles, and said substrate colors the whole region of said substrate It is characterized by providing the color filter which colored by [ as the number of nozzles used for coloring becoming equal substantially ] by each scan, the display which equips one with the quantity of light adjustable means which makes the quantity of light adjustable, and a picture signal output means to output a picture signal to this display.

[0087] Moreover, the manufacture approach of the color filter concerning this invention All the nozzles of the ink jet head which has two or more ink regurgitation nozzles are divided into two or more nozzle groups for every predetermined number. The change process for being the manufacture approach of a



color filter of changing these two or more nozzle groups if needed, and coloring each pixel of discharge and a color filter a substrate for ink, and changing said two or more nozzle groups, When the nozzle group used according to said change process is changed, it is characterized by providing the compensation process which compensates the location gap with the this used nozzle group and said each pixel.

[0088] Moreover, in the manufacture approach of the color filter concerning this invention, said change process is characterized by having the process which detects or presumes the poor regurgitation of the nozzle group which is carrying out current use, and the process which changes said two or more nozzle groups based on this detection or a presumed result.

[0089] Moreover, in the manufacture approach of the color filter concerning this invention, said change process is characterized by having the process which detects the temperature of two or more of said nozzle groups, and the process which changes said two or more nozzle groups based on the detection result in this detection process.

[0090] Moreover, in the manufacture approach of the color filter concerning this invention, said ink jet head is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0091] Moreover, the manufacturing installation of the color filter concerning this invention All the nozzles of the ink jet head which has two or more ink regurgitation nozzles are divided into two or more nozzle groups for every predetermined number. The change means for being the manufacturing installation of a color filter which changes these two or more nozzle groups if needed, and colors each pixel of discharge and a color filter a substrate for ink, and changing said two or more nozzle groups, When the nozzle group used with the control means which controls change actuation of this change means, and said change means is changed, it is characterized by providing a compensation means to compensate the location gap with the this used nozzle group and said each pixel.

[0092] Moreover, in the manufacturing installation of the color filter concerning this invention, it is characterized by for said control means detecting or presuming the poor regurgitation of the nozzle group which is carrying out current use, and changing said two or more nozzle groups based on this detection or a presumed result.

[0093] Moreover, in the manufacturing installation of the color filter concerning this invention, said control means detects the temperature of two or more of said nozzle groups, and is characterized by changing said two or more nozzle groups based on this detection result.

[0094] Moreover, in the manufacturing installation of the color filter concerning this invention, said ink jet head is a head which carries out the regurgitation of the ink using heat energy, and is characterized by having the heat energy generating object for generating the heat energy given to ink.

[0095]

[Embodiment of the Invention] Hereafter, the suitable operation gestalt of this invention is explained to a detail with reference to an accompanying drawing.

[0096] (1st operation gestalt) The production process of a color filter by the manufacturing installation of the color filter concerning the operation gestalt of this invention is first shown in drawing 2.

[0097] In this operation gestalt, although a glass substrate is generally used as a substrate 1, if it has need properties, such as transparency as a color filter for liquid crystal, and a mechanical strength, it will not be limited to a glass substrate.

[0098] First, the glass substrate 1 with which the black matrix 2 for clarifying the break of each pixel of a

color filter and making an image clear was formed is prepared ( drawing 2 (a)). In addition, as the formation approach of a black matrix, a metal thin film is formed by the spatter or vacuum evaporation, and there is the approach of carrying out patterning according to a FOTORISO process.

[0099] Next, as shown in drawing 2 (b), on the substrate 1 with which the black matrix 2 was formed, a coating ingredient is applied, it prebakes if needed, and the resin constituent layer 3 in which the ink absorptivity of an optical exposure part goes up by an optical exposure or an optical exposure, and heat treatment is formed. The resin constituent with which the ink absorptivity of the exposure section goes up by using together exposure or exposure, and heat treatment as a coating ingredient is used. This is for preventing diffusion of the color mixture of ink, and the ink beyond the need using a difference arising in ink absorptivity in the exposure section and the unexposed section.

[0100] Subsequently, by performing pattern exposure for the coating ingredient of the part which is not shaded by the black matrix 2 beforehand through a mask 4, parent ink processing is performed ( drawing 2 (c)), and a latent image is formed ( drawing 2 (d)).

[0101] Then, the ink of R (red), G (green), and B (blue) is colored the part 6 formed into parent ink using an ink jet head ( drawing 2 (e)), and ink desiccation is performed if needed.

[0102] Subsequently, optical exposure, heat treatment, or an optical exposure and heat treatment are performed, the colored coating ingredient is stiffened, and a protective coat 8 is formed if needed ( drawing 2 (f)). As a protective coat 8, the inorganic film formed of a resin ingredient a photo-curing type, a heat-curing type, or light-and-heat concomitant use type or vacuum evaporation, a spatter, etc. can be used, and it has the transparency at the time of considering as a color filter, and it can be used if a subsequent ITO (Indium Tin Oxide) formation process, an orientation film formation process, etc. can be borne.

[0103] Next, drawing 3 is drawing having shown other examples of the production process of a color filter.

[0104] Drawing 3 (a) shows the glass substrate 1 equipped with the black matrix 2 which are the light transmission section 7 and the protection-from-light section. First, the resin constituent which can harden with an optical exposure or an optical exposure, and heating on the substrate 1 with which the black matrix 2 was formed, and has ink receptiveness is applied, it prebakes if needed, and resin layer 3' is formed ( drawing 3 (b)). The methods of application, such as a spin coat, a roll coat, a bar coat, a spray coat, and a DIP coat, can be used for formation of resin layer 3', and it is not especially limited to it.

[0105] Next, part 5' (non-coloring part) which is made to harden a part of resin layer, and does not absorb ink by performing pattern exposure for the resin layer of the part shaded by the black matrix 2 beforehand using photo-mask 4' is formed ( drawing 3 (c)). Each color of R, G, and B is colored at once using an ink jet head after that ( drawing 3 (d)), and ink is dried if needed.

[0106] What has opening for stiffening the protection-from-light part by the black matrix as photo-mask 4' used in the case of pattern exposure is used. Under the present circumstances, in order to prevent the color omission of the coloring agent in the part which touches a black matrix, it is required to give comparatively much ink. Therefore, it is desirable to use the mask which has opening narrower than the width of face (protection from light) of a black matrix.

[0107] As ink used for coloring, it is possible to use a pigment system and a pigment system, and liquefied ink and solid ink are usable.

[0108] If it has ink receptiveness and can harden as a resin constituent which is used by this invention and which can be hardened by one [ at least ] processing of an optical exposure or an optical exposure, and

heating, either will be usable and a cellulosic or its denaturation objects, such as for example, acrylic resin, an epoxy resin, silicon resin, hydroxypropylcellulose, hydroxyethyl cellulose, methyl cellulose, and a carboxymethyl cellulose, etc. will be mentioned as resin.

[0109] In order for these resin to advance crosslinking reaction with light or light, and heat, it is also possible to use a photoinitiator (cross linking agent). As a photoinitiator, dichromate, a bis-azide compound, a radical system initiator, a cation system initiator, an anion system initiator, etc. are usable. Moreover, these photoinitiators can be mixed or it can also be used combining other sensitizers. Furthermore, it is also possible to use together photo-oxide generating agents, such as an onium salt, as a cross linking agent. In addition, in order to advance crosslinking reaction more, you may heat-treat after an optical exposure.

[0110] The resin layer containing these constituents is very excellent in thermal resistance, a water resisting property, etc., and can bear enough the elevated temperature or washing process in a back process.

[0111] As an ink jet method used by this invention, the bubble jet type which used the electric thermal-conversion object as an energy generation component, or the piezo jet type using a piezoelectric device is usable, and coloring area and a coloring pattern can be set as arbitration.

[0112] Moreover, although this example shows the example by which the black matrix was formed on the substrate, even if formed on a resin layer after [ after a black matrix's forming the resin constituent layer which can be hardened ] coloring, there is especially no problem and the gestalt is not limited to this example. Moreover, although it is desirable to form a metal thin film by the spatter or vacuum evaporation on a substrate, and to carry out patterning according to a FOTORISO process as the formation approach, it is not limited to this.

[0113] Subsequently, only heat treatment performs optical exposure and heat treatment, and only an optical exposure stiffens the resin constituent which can be hardened ( drawing 3 (e) ), and forms a protective layer 8 if needed ( drawing 3 (f) is carried out.). In addition, in drawing nu shows luminous intensity and, in heat treatment, heat is applied instead of the light of hnu. It is usable, if it can form, using the 2nd resin constituent a photo-curing type, a heat-curing type, or light-and-heat concomitant use type as a protective layer 8, or it can form by vacuum evaporation or the spatter using an inorganic material, it has the transparency at the time of considering as a color filter and a subsequent ITO formation process, an orientation film formation process, etc. can be borne enough.

[0114] The cross section of the TFT (ThinFilm Transistor) electrochromatic display panel which built the color filter by this operation gestalt into drawing 4 and drawing 5 is shown. In addition, the gestalt is not limited to this example.

[0115] Generally an electrochromatic display panel sets the color filter substrate 1 and the opposite substrate 254, is full, and is formed by enclosing the liquid crystal compound 252. Inside one substrate 254 of a liquid crystal panel, TFT (Thin Film Transistor) (un-illustrating) and the transparent pixel electrode 253 are formed in the shape of a matrix. Moreover, inside another substrate 1, a color filter 10 is installed so that the color material of RGB may arrange in the location which counters a pixel electrode, and the transparent counterelectrode (common electrode) 250 is formed on it at the whole surface. Although the black matrix 2 is usually formed in the color filter substrate 1 side (refer to drawing 4 ), it is formed in the TFT substrate side which counters in a BM (black matrix) on-array type liquid crystal panel (refer to drawing 5 ). Furthermore, the orientation film 251 is formed in the field of both substrates,

and a liquid crystal molecule can be made to arrange in the fixed direction by carrying out rubbing processing of this. Moreover, the polarizing plate 255 has pasted the outside of each glass substrate, and the gap (about 2-5 micrometers) of these glass substrates is filled up with the liquid crystal compound 252. Moreover, generally as a back light, the combination of a fluorescent lamp (un-illustrating) and a scattered plate (un-illustrating) is used, and it displays by operating a liquid crystal compound as an optical shutter to which the permeability of back light is changed.

[0116] The example at the time of applying such a liquid crystal panel to an information processor is explained with reference to drawing 6 thru/or drawing 8.

[0117] Drawing 6 is the block diagram showing the outline configuration at the time of applying the above-mentioned liquid crystal panel to a word processor, a personal computer, facsimile apparatus, and the information processor that has a function as a reproducing unit.

[0118] Among drawing, they are the control section which controls the whole equipment, and 1801 are equipped with CPUs and various I/O Ports, such as a microprocessor, and a control signal, a data signal, etc. are outputted to each part, or they are controlling by inputting the control signal and data signal from each part. 1802 is the display section and the image data read by various menus, document information, and the image reader 1807 is displayed on this display screen. 1803 is the transparent pressure-sensitive-type touch panel prepared on the display section 1802, and can perform the item input Sagitta label location input on the display section 1802 etc. by pressing the front face with a finger etc.

[0119] It is FM (Frequency Modulation) sound-source section, and 1804 memorizes the music information created by the music editor etc. as digital data to the memory section 1810 or external storage 1812, it is read from these memory etc. and performs FM modulation. The electrical signal from the FM sound section 1804 is changed into audible sound by the loudspeaker section 1805. The printer section 1806 is used as a printing terminal of a word processor, a personal computer, facsimile apparatus, and a reproducing unit.

[0120] 1807 is the image reader section which reads manuscript data in photoelectricity and inputs them, is prepared into the conveyance path of a manuscript and performs read of the other various manuscripts of a facsimile manuscript or a copy manuscript.

[0121] 1808 is the transceiver section of facsimile transmission of the manuscript data read in the image reader section 1807, and the facsimile (FAX) which receives and decodes the sent facsimile signal, and has an interface function with the exterior. 1809 is the telephone section which has various telephone functions, such as a usual telephone function, a usual answering machine function, etc.

[0122] 1810 is ROM which memorizes a system program, a manager program other application programs, etc. a character font, a dictionary, etc., the application program loaded from external storage 1812, document information, and the memory section which contains a Video RAM etc. further.

[0123] 1811 is the keyboard section which inputs document information, various commands, etc.

[0124] 1812 is the external storage which uses a floppy disk, a hard disk, etc. as a storage, and the application program of document information, music or speech information, and a user etc. is stored in this external storage 1812.

[0125] Drawing 7 is the typical external view of the information processor shown in drawing 6.

[0126] 1901 display various menus, graphic form information, document information, etc. with the flat-panel display using the above-mentioned liquid crystal panel among drawing. On this display 1901, the front face of a touch panel 1803 can perform a coordinate input and an item assignment input by

pressing with a finger etc. 1902 is a hand set currently used when equipment functions as telephone. It connects with the body through the code removable, and a keyboard 1903 can perform various document functions and various data inputs. Moreover, various function key 1904 grades are prepared in this keyboard 1903. 1905 is insertion opening of the floppy disk to external storage 1812.

[0127] The manuscript which 1906 is the form installation section which lays the manuscript read in the image reader section 1807, and was read is discharged from an equipment posterior part. Moreover, in facsimile reception etc., it is printed from an ink jet printer 1907.

[0128] When functioning considering the above-mentioned information processor as a personal computer or a word processor, the various information inputted from the keyboard section 1811 is processed by the control section 1801 according to a predetermined program, and is outputted to the printer section 1806 as an image.

[0129] When functioning as a receiver of facsimile apparatus, according to a predetermined program, reception of the facsimile information inputted from the FAX transceiver section 1808 through the communication line is carried out by the control section 1801, and it is outputted to the printer section 1806 as a receiving image.

[0130] Moreover, when functioning as a reproducing unit, a manuscript is read and the read manuscript data are outputted to the printer section 1806 by the image reader section 1807 as a copy image through a control section 1801. In addition, when functioning as a receiver of facsimile apparatus, the manuscript data read by the image reader section 1807 are transmitted to a communication line through the FAX transceiver section 1808, after transmitting processing is carried out by the control section 1801 according to a predetermined program.

[0131] In addition, the information processor mentioned above becomes it is good also as one apparatus which built the ink jet printer in the body, and possible [ raising portable nature more ] in this case, as shown in drawing 8 . In this drawing, a corresponding sign is given to the part which has the same function as drawing 7 .

[0132] Next, drawing 9 is drawing showing the color pattern of the color filter manufactured by the color filter manufacturing installation of this operation gestalt. The coloring section colored in the ink of R, G, and B, respectively is one pixel, and is carrying out the rectangle mostly. When the direction of X, the direction of X, and a right-angled direction are made into the direction of Y for the longitudinal direction of one pixel, all the magnitude of one pixel is the same, it is 150micrometerx60micrometer, and the pitch of the direction of X is [ the pitch of 300 micrometers and the direction of Y ] 100 micrometers. And the pixel of the same color as the direction of X is arranged in a straight line, and in the direction of Y, each pixel is arranged so that the colors of an adjacent pixel may differ. Moreover, the pattern shown in this drawing is equivalent to the pattern of the black matrix created at the process of drawing 2 (a).

[0133] As the number of a pixel is 1920 pieces (each 640 colors) and is shown in the direction of X in 480 pieces and the direction of Y at drawing 10 , the magnitude of the screen of a color filter is 144mmx192mm, and supports the liquid crystal panels of the 9.4 inch size whose die length of the diagonal line is 240mm.

[0134] Next, drawing 11 is drawing having shown the configuration of the manufacturing installation for manufacturing the color filter shown in drawing 9 .

[0135] In drawing 11 , the manufacturing installation 20 was laid on the non-illustrated stand, and is equipped with the ink jet head IJH fixed above movable X-Y table 22 and this X-Y table 22 on the stand

through non-illustrated supporter material in the direction of X in drawing, and the direction of Y. On X-Y table 22, the glass substrate 1 in which the black matrix 2 and the resin constituent layer 3 were formed by the approach already mentioned above is laid. The ink jet head IJH is equipped with blue head 120c which carries out the regurgitation of the blue ink to red head 120a which carries out the regurgitation of the red ink, and green head 120b which carries out the regurgitation of the green ink, and each of these heads 120a, 120b, and 120c are constituted so that the regurgitation of the ink can be carried out independently, respectively.

[0136] Moreover, the recovery unit 30 for performing recovery action of the ink jet head IJH is formed in the edge of X-Y table 22, and to X-Y table 22, it is arranged so that it may be movable to a Z direction.

[0137] This recovery unit 30 plays the ink droplet which prevented \*\*\*\*\* of the nozzle of the ink jet head IJH, and was attached to the nozzle side of the ink jet head IJH, and the role which prevents wiping off dust, falling while the role which is always made to perform the regurgitation of ink normally, and the dust attached to the nozzle side color a glass substrate, and becoming poor, and shows that configuration to drawing 12.

[0138] 31a, 31b, and 31c are the caps corresponding to red head 120a of the ink jet head IJH, green head 120b, and blue head 120c, respectively. Caps 31a, 31b, and 31c prevent that ink becomes regurgitation impossible by covering the nozzle side of the ink jet heads 120a, 120b, and 120c which correspond to drawing 13, respectively so that it may be shown, when the ink jet heads 120a, 120b, and 120c do not perform coloring actuation of a color filter to a glass substrate 1. Moreover, when the ink jet heads 120a, 120b, and 120c which stopped carrying out fixed time amount regurgitation resume the regurgitation, even if it is the case where the caps 31a, 31b, and 31c mentioned above are used The non-regurgitation and the kink that will bend and several shots of the beginning will breathe out under the effect of thickening of ink etc. without ink's not carrying out the regurgitation or carrying out the regurgitation straightly may be generated. In that case, after breathing out the ink more than fixed, it returns to an all seems well and ink is breathed out straightly. If such a thing breaks out during coloring of a glass substrate 1, ink cannot color a pixel, or ink will not reach a right location, and it will become a defect. Therefore, in order to avoid such a phenomenon, before coloring a glass substrate 1, the reserve regurgitation which makes the ink of a constant rate breathe out is performed.

[0139] Moreover, although actuation of this reserve regurgitation was considered as a configuration which is performed with a cap with this operation gestalt, it may be performed into the other part by preparing the receptacle part only for reserve regurgitation.

[0140] Furthermore, the caps 31a, 31b, and 31c From the side which supplies ink to each ink jet heads 120a, 120b, and 120c Pressurize or circulate ink periodically by the ink pressurization motor which is not illustrated, and the bubble and dust which accumulated in the nozzle leading to the non-regurgitation are compulsorily discharged out of a nozzle. When performing actuation (pressurization recovery action) for maintaining the ink jet heads 120a, 120b, and 120c at an always normal condition, the role which carries out capping and receives the discharged ink is also played so that ink may not be discharged too much from a nozzle.

[0141] 32a, 32b, and 32c are blades which perform wiping actuation of a nozzle side, and its thing with absorptivity is desirable. Blades 32a, 32b, and 32c are for the ink droplet attached to the nozzle side of the ink jet heads 120a, 120b, and 120c, respectively and ink Myst generated when ink is breathed out to wipe off the thing adhering to a nozzle side by actuation of the direction of X of the recovery system unit 30, as

shown in drawing 14 .

[0142] 33 is a recovery bucket, it is arranged at Caps 31a, 31b, and 31c and Bladea [ 32 ],b [ 32 ], and 32c bottom, and ink and wash water for making it ink, and the cap wash water mentioned later and blade wash water which leaked and came out of the cap not leak in equipment which it is and accumulated in the recovery bucket 33 are led to the wastewater tub 37 with a tube. Moreover, the recovery bucket 33 is constituted so that it may operate to Caps 31a, 31b, and 31c, and Blades 32a, 32b, and 32c and one, and it operates similarly with Caps 31a, 31b, and 31c and Blades 32a, 32b, and 32c at the time of capping actuation of a Z direction, and wiping actuation of the direction of X.

[0143] 34a, 34b, and 34c are atmospheric-air open valves, with the tube, one side is open for free passage in each caps 31a and 31b and 31c, and one side serves as atmospheric pressure. When cap inner volume decreases and the pressure in a cap becomes more than an atmospheric pressure, this pushes in the ink in a nozzle in an ink jet head, in order Caps 31a, 31b, and 31c are made of rubber and to push them against each head by the force of about 1 or more kgves at the time of capping actuation, and in order to prevent becoming the non-regurgitation, it is prepared. Usually, before closing and performing capping actuation, after opening an atmospheric-air open valve and completing capping actuation, the role which leaves the inside of a cap atmospheric pressure is played by closing.

[0144] As 35 was mentioned above, it is a cap suction pump for attracting the ink breathed out in attracting the ink which accumulated in the cap at the time of pressurization recovery action, and the cap for the reserve regurgitation. The cap suction pump 35 is connected to each one cap of every by the tube, and the attracted ink is discharged to the wastewater tub 37, respectively.

[0145] It is a blade suction pump, and 36 is a pump for attracting the water which absorbed water to the blades 32a, 32b, and 32c which consisted of absorptivity ingredients, and the ink absorbed at the time of wiping actuation, and one connects at a time by the tube from each blade, and it discharges water and ink to the wastewater tub 37. The water and ink which were discharged to the wastewater tub 37 are once collectively discharged out of equipment.

[0146] 38 (refer to drawing 12 ) is a wash water tank for collecting Caps 31a, 31b, and 31c and the wash water for washing Blades 32a, 32b, and 32c, and sprays wash water from each wash water supply nozzle 40 by opening and closing the wash water supply valve 39. These wash water supply nozzle 40 is drawing 11 , and when the ink jet head IJH (120a, 120b, 120c) finishes coloring one glass substrate 1, it is arranged so that it may become right above the location to which the recovery system unit 30 comes.

[0147] 41 (refer to drawing 12 ) is a wash water extra feed valve for supplying wash water to a wash water tank 38, if the wash water residue detection sensor 42 detects that the wash water in a wash water tank 38 decreased, will be opened fixed time and will supply wash water to a wash water tank 38. Moreover, the pure water which removed the impurity etc. from tap water is used for this wash water.

[0148] Next, drawing 15 is drawing showing the structure of the ink jet head IJH for carrying out the regurgitation of the ink to the resin constituent layer 3. In addition, since three ink jet heads 120a, 120b, and 120c are constituted by the respectively same structure, drawing 15 is shown on behalf of one of them.

[0149] In drawing 15 , the outline configuration of the ink jet head IJH is carried out from the heater board 104 which is the substrate with which two or more heaters 102 for heating ink were formed, and the top plate 106 put on this heater board 104. Two or more ink deliveries 108 are formed in the top plate 106, and the liquid route 110 of the shape of a tunnel connected with this delivery 108 is formed behind the delivery 108. Each liquid route 110 is isolated with the next liquid route by the septum 112. Each



liquid route 110 is connected common to one liquid ink room 114 in that back, ink is supplied to the liquid ink room 114 through the ink feed hopper 117, and this ink is supplied to each liquid route 110 from the liquid ink room 114.

[0150] Alignment of the heater board 104 and the top plate 106 is carried out, and they are assembled by condition like drawing 15 so that each heater 102 may come to the location corresponding to each liquid route 110. In drawing 15, although only two heaters 102 are shown, the heater 102 is arranged one [ at a time ] corresponding to each liquid route 110. And in the condition of having been assembled like drawing 15, if a predetermined driving pulse is supplied to a heater 102, the ink on a heater 102 boils and air bubbles are formed, and ink will be extruded by the cubical expansion of these air bubbles from a delivery 108, and it will be breathed out.

[0151] Drawing 16 is the block diagram showing the configuration of the manufacturing installation of the color filter of this operation gestalt.

[0152] In drawing 16, the direction drive motor 56 of X and the direction drive motor 58 of Y for driving X-Y stage 22 in the XY direction are connected to CPU50 which controls actuation by the whole manufacturing installation through the X motorised circuit 52 and the Y motorised circuit 54, and the Z direction drive motor 59 for driving the recovery system unit 30 to a Z direction is connected to it through the Z motorised circuit 55.

[0153] Moreover, the ink jet head IJH is connected to CPU50 through the head drive circuit 60. Furthermore, the X encoder 62 and the Y encoder 64 for detecting the location of X-Y stage 22 are connected to CPU50, and the positional information of X-Y stage 22 is inputted into it. Moreover, the control program in program memory 66 is also inputted. Based on the positional information of this control program, the X encoder 62, and the Y encoder 64, X-Y stage 22 is moved, the ink jet head IJH brings about caudad the grid frame (pixel) of the request on a glass substrate 1, and by breathing out the ink of a desired color and coloring in that pixel, CPU50 colors a glass substrate 1 and goes. A color filter is manufactured by performing this to each pixel. Moreover, whenever one coloring of a glass substrate 1 is completed, just under the ink jet head IJH, the recovery system unit 30 attached in the edge of X-Y stage 22 is moved, Blades 32a, 32b, and 32c are moved in the direction of X with the direction drive motor 56 of X, and wiping actuation is performed. Moreover, with the Z direction drive motor 59, Caps 31a, 31b, and 31c are moved to a Z direction, and reserve discharging is performed. The activity which exchanges the glass substrate 1 which it finished coloring, and the glass substrate 1 before coloring by the substrate transport device which is not illustrated in the meantime is done.

[0154] Next, actuation of the color filter manufacturing installation by this operation gestalt is explained using drawing 17.

[0155] First, a glass substrate 1 is made to breathe out ink from the ink jet head IJH at step S1, and one glass substrate 1 is colored. If one sheet finishes coloring, X-Y stage 22 will be operated, the recovery system unit 30 will be moved to the location of the wash water supply nozzle 40, and it will wash to Blades 32a, 32b, and 32c, pouring wash water (step S2). Next, X-Y stage 22 is moved so that the recovery unit 30 may come to the location of the ink jet head IJH (step S3). When it is judged that they are under the fixed numbers that have the coloring number of sheets at that time by step S4, in order to wipe off ink Myst attached to the nozzle side with Blades 32a, 32b, and 32c, the usual wiping actuation is performed (step S5). When it colors more than a certain fixed number of sheets, in order to discharge the thickening ink in a nozzle, and the bubble of the head liquid interior of a room out of a nozzle, pressurization.



recovery action is performed (step S6). With this operation gestalt, whenever it colors 30 glass substrates, pressurization recovery action is performed. It is more desirable not to carry out if possible, since this pressurization recovery action is only merely thrown-away actuation rather than uses ink for coloring, and a routing counter also increases and it has time amount so much.

[0156] If pressurization recovery action is performed, since an ink droplet will adhere to a nozzle side, wiping actuation is performed after that at the time of pressurization (step S7). Since the ink which came out of the nozzle at the time of pressurization recovery action (step S6) adheres to a cap, cap washing actuation is performed next (step S8). In ending coloring after judging whether coloring actuation is terminated for the maintenance of equipment etc. (step S9), termination actuation of capping etc. is performed and it ends actuation (step S12). When continuing coloring, each ink jet heads 120a, 120b, and 120c are capped, and the reserve regurgitation which is regurgitation of a fixed number of ink is performed (step S10). Then, in order to wash the ink which adhered to the cap in the reserve regurgitation, cap washing actuation is performed (step S11). While performing such recovery action, a substrate [ finishing / coloring ] and the substrate before coloring are replaced, the next coloring actuation is performed, and this is repeated.

[0157] Next, the characteristic part of this invention for the coloring actuation which colors a glass substrate is explained using drawing 18 and drawing 19.

[0158] For each head 120a, 120b, and 120c of the ink jet head IJH shown by drawing 18, a nozzle pitch is the ink jet head in which the number of effective nozzles is 512 pieces, and each head had the resolving power of 70.5 micrometers, i.e., 360dpi. As the nozzle of the ink jet head IJH is used every five nozzles and drawing 18 shows since the pixel of each color is arranged in 300-micrometer pitch and differs from the nozzle pitch of the ink jet head IJH as shown in drawing 9, only 102 of 512 pieces are used for the color filter in this operation gestalt for the ink jet head IJH. For the reason, 31.672 degrees was leaned and the ink jet head IJH is arranged, as drawing 18 shows. The physical relationship of arrangement of the pixel of each color and the nozzle of the ink jet head IJH is shown in drawing 19. Only the nozzle in every five shown as a continuous line among the nozzles 108 of each ink jet heads 120a, 120b, and 120c is arranged so that it may be located on the pixel of the color to which each color is equivalent. The nozzle shown with the other broken line exists in locations other than the pixel of a corresponding color. Therefore, the nozzle shown as a continuous line is arranged so that the pitch of the direction of parenchyma top Y may be set to 300 micrometers. Moreover, since the nozzle of each ink jet heads 120a, 120b, and 120c is arranged by 70.5-micrometer regular intervals, if it also looks at the nozzle shown with a broken line every five nozzles, it is arranged in 300-micrometer pitch in the direction of Y.

[0159] Next, the process which colors the pixel of each color as shown in the color filter which has an effective viewing area as shown by drawing 10 by drawing 9 is explained using the ink jet head IJH with which the nozzle 108 was arranged by this appearance. It shifts 100 micrometers of each ink jet heads at a time in the direction of Y, and has arranged so that it may come on the pixel of the color to which the nozzle in every [ of each ink jet head IJH ] five corresponds to drawing 19 so that the include angle of 31.672 degrees may be given and it may arrange as drawing 18 shows [ as opposed to / as mentioned above / a glass substrate 1 ] the ink jet head IJH, and it may be shown. Here, the thing of the structure same related completely as a color is used for the ink jet heads 120a, 120b, and 120c. Moreover, although an ink jet head is fixed and a glass substrate moves within an actual manufacturing installation, by drawing 18, a glass substrate is fixed, and it is drawing so that an ink jet head may move. Since an ink

jet head and a glass substrate only move relatively, it is substantially the same.

[0160] As shown in drawing 18 , the width of face which can be colored with one scan of each head is one fifth of 102 pixels of inside with a 512-piece nozzle, and the distance of the pixel center to center of both ends is 30.3mm. Therefore, after scanning the ink jet head IJH in the direction of X once on a glass substrate as shown in drawing 18 since the whole inside of an effective viewing area of a glass substrate cannot be colored only with one scan of the direction of X, make it displaced relatively in the direction of Y 30.6mm, it is made to scan in the direction of X again, this is repeated further once again, and the whole effective viewing area of a glass substrate is colored. In the meantime, it is controlled by each ink jet heads 120a, 120b, and 120c to always use only the same nozzle in every five.

[0161] Two or more ink is made to breathe out within the limit surrounded by the black matrix 2 continuously from the same nozzle at this time, so that ink may cover the whole frame, as the core of ink enters as shown in drawing 20 to one pixel.

[0162] Moreover, also in the actuation of the reserve regurgitation performed before beginning to color one glass substrate explained at step S10 of drawing 17 , the ink jet head IJH is controlled so that only the nozzle usually used for coloring performs the reserve regurgitation. However, in this operation gestalt, whenever actuation of the pressurization recovery which discharges ink from all nozzles colors 30 glass substrates, for a deer \*\*\*\*\* reason, the nozzle which is not used for coloring is not used at all in the meantime. If it sets without using a nozzle, ink may fix, a nozzle may be plugged up completely and pressurization recovery may not recover, either. Therefore, in this operation gestalt, whenever it colors ten substrates, reserve discharging of all the nozzles is carried out.

[0163] Thus, since only the nozzle which becomes possible [ lengthening spacing of actuation of the pressurization recovery which consumes ink vainly by making it operate ], and is usually sometimes used performs discharging, when it becomes possible to minimize the consumption of the ink in recovery action and pressurization recovery action decreases, it becomes possible to increase the coloring number of sheets per unit time amount. Moreover, even if a life comes to the nozzle used every five by harnessing the nozzle which is not used for this appearance, this ink jet head can be again used by arranging so that the other nozzle may be used.

[0164] (2nd operation gestalt) Drawing 21 and drawing 22 are drawings showing the nozzle configuration of the ink jet head IJH in the manufacturing installation of the color filter of the 2nd operation gestalt of this invention.

[0165] In drawing 21 , that from which the array of a nozzle turned into two trains is shown, and the nozzle is arranged by the longitudinal direction of a head with the resolution of 70.5-micrometer pitch, i.e., 360dpi.

[0166] In using this head for coloring of the color filter whose pitch of the pixel of each color as shown by drawing 9 is 300 micrometers, the nozzle in every six pieces as shown as a thick continuous line is used, and 44.829 degrees of heads are leaned and it arranges them.

[0167] In drawing 22 , that from which the array of a nozzle turned into three trains is shown, and the nozzle is arranged by the longitudinal direction of a head with the resolution of 70.5-micrometer pitch, i.e., 360dpi.

[0168] In using this head for coloring of the color filter whose pitch of the pixel of each color as shown by drawing 9 is 300 micrometers, the nozzle in every six pieces as shown as a thick continuous line like the case of drawing 21 is used, and 44.829 degrees of heads are leaned and it arranges them.

[0169] Thus, even if it is the case where it is the ink jet head with which the nozzle was arranged, the same effectiveness is acquired by performing the same regurgitation control as a pre-operation gestalt.

[0170] (3rd operation gestalt) This 3rd operation gestalt explains using the drawing used for explanation of the 1st operation gestalt, while the configuration of the manufacturing installation of a color filter is the same as that of the 1st operation gestalt, and omitting explanation of equipment, since the description is in that control approach.

[0171] As shown in drawing 18, the width of face which can be colored with one scan of each head is one fifth of 102 pixels of inside with a 512-piece nozzle, and the distance of the pixel center to center of both ends is 30.3mm. Therefore, since the whole inside of an effective viewing area of a glass substrate cannot be colored only with one scan of the direction of X As shown in drawing 18, after scanning the ink jet head IJH in the direction of X once on a glass substrate, It is made to scan in the direction of X again, performing [ make it displaced relatively in the direction of Y 30.6mm, arrange so that it may be located on the pixel to which the nozzle used with the pre-scan corresponds, and ] the regurgitation of ink with the same nozzle as a pre-scan. Since it remains by each color of 28 pixels as the part which cannot be colored with the 2nd scan shows drawing 18, arrange so that it may be located on the pixel to which the nozzle which you made it displaced relatively in the direction of Y, and used the ink jet head IJH with the pre-scan corresponds, and each head is made to scan in the direction of X again using 28 nozzles among the nozzles used with the last scan, and the whole effective viewing area of a glass substrate is colored. Migration of the direction of Y for changing the relative position of the head and glass substrate between each scan moves X-Y stage 22 so that it may carry out immediately after coloring it the last pixel with one scan. In the meantime, it is controlled by each ink jet heads 120a, 120b, and 120c to always use only the same nozzle in every five.

[0172] Two or more ink is made to breathe out within the limit surrounded by the black matrix 2 continuously from the same nozzle at this time, so that ink may cover the whole frame, as the core of ink enters as shown in drawing 20 to one pixel.

[0173] Thus, since it only stops slightly between scans, the always high-definition coloring of all the nozzles used for coloring by considering as the nozzle surely used with the pre-scan without using the nozzle which did not use the nozzle used with a back scan with a pre-scan is attained, with the condition maintained that a head is stabilized and can carry out the regurgitation of the ink. Moreover, since it is not necessary to make a head displaced relatively in the location of a cap or a reserve regurgitation receptacle, and to perform reserve discharging between each scan, and the time amount which per substrate takes is shortened and the volume per unit time amount increases, the cost cut of a color filter is attained.

[0174] Moreover, as shown in drawing 21 and drawing 22, even if it is the case where it is the ink jet head by which the nozzle has been arranged, the same effectiveness is acquired by performing the same regurgitation control as this operation gestalt.

[0175] Moreover, although it colored with this operation gestalt so that the nozzle of the usable maximum number might be used with the 6th scan [ the 1st time - ] and the remainder might use only about 1/only of nozzles of 4, the nozzle used with a back scan besides this example is a nozzle surely used with the pre-scan, and the same effectiveness is acquired no matter it may be what combination, if it is the approach whose number of nozzles to be used decreases.

[0176] (4th operation gestalt) With this 4th operation gestalt, since others are the same only by the

configurations of the manufacturing installation of a color filter differing in the number of nozzles of the 1st operation gestalt and a head, only a different part is explained.

[0177] As shown in drawing 23, the greatest width of face which can be colored with one scan of each head is one fifth of 272 pixels of inside with a 1360-piece nozzle, and the distance of the pixel center to center of both ends is 81.6mm. Therefore, since the whole inside of an effective viewing area of a glass substrate cannot be colored only with one scan of the direction of X As shown in drawing 23, after scanning the ink jet head IJH in the direction of X once on a glass substrate (scan1), It is made to scan in the direction of X again, performing [ make it displaced relatively in the direction of Y 81.6mm (step1), arrange so that it may be located on the pixel to which the nozzle used with the pre-scan corresponds, and ] the regurgitation of ink with the same nozzle as a pre-scan (scan2). Since it remains by each color of 96 pixels as the part which cannot be colored with the 2nd scan (scan2) shows by drawing 23 The ink jet head IJH is made displaced relatively in the direction of Y (step2). Arrange so that it may be located on the pixel to which the nozzle used with the pre-scan (scan2) corresponds, and each head is made to scan in the direction of X again using 96 nozzles among the nozzles used with the last scan (scan2) (scan3), and the whole effective viewing area of a glass substrate is colored. Migration of the direction of Y for changing the relative position of the head and glass substrate between each scan operates X-Y stage 22 so that it may carry out immediately after coloring it the last pixel with one scan.

[0178] In the meantime, it is controlled by each ink jet head IJH to always use only the same nozzle in every five.

[0179] Here, in the case of drawing 23, its attention is paid to the nozzle 200 at the left end of ink jet head 120a. The thick continuous line 201 shows the distance which moved without carrying out the regurgitation of the ink between the scans (scan2) of a two-times eye from the first scan (scan1). The die length of this thick continuous line can be calculated as follows, when spacing of the head of the both ends of the scanning direction is set to 48mm.

[0180]  $(95.598 \times \sin 31.672^\circ + 48) \times 2 + 81.6 = 277.989$  (mm)

Next, drawing 24 which shows the 4th operation gestalt by this invention is explained.

[0181] In drawing 24, the number of nozzles used by each scan (including the scan of the last round) is divided so that it may become equal substantially, and is used as 213 nozzles by 213 nozzles and the third scan (scan3) by the first scan (scan1) at the scan (scan2) of 214 nozzles and a two-times eye so that it may become almost the same. At this time, its attention is paid to the nozzle 202 of the left end used for the ink regurgitation of ink jet head 120a like the case where it calculates, by drawing 23. If the thick continuous line 203 shows the distance which moved without carrying out the regurgitation of the ink between the scans (scan2) of a two-times eye from the first scan (scan1), the die length of this thick continuous line can be calculated as follows, when spacing of the head of the both ends of the scanning direction is made the same as 48mm and the case of drawing 23.

[0182]  $(75.153 \times \sin 31.672^\circ + 48) \times 2 + 64.2 = 239.119$  (mm)

In the case of drawing 24, as compared with the case of drawing 23, it turns out that the distance which moves without carrying out the regurgitation of the ink of the ink regurgitation nozzle between scans is short so that clearly from this count. That is, this shows that the time amount which does not carry out the regurgitation of the ink becomes short. If it keeps touched to air when a regurgitation nozzle does not carry out the regurgitation of the ink, the volatile component in ink evaporates, ink viscosity increases, the non-regurgitation which does not carry out the regurgitation of the ink will be produced, or ink will

produce the kink which is not breathed out straightly. In order not to make this phenomenon cause, it is important to shorten time amount which leaves an ink regurgitation nozzle in air in the condition of not carrying out the regurgitation.

[0183] Therefore, since the time amount with which it is between scans as compared with the case of drawing 23 in the case of drawing 24 , and an ink regurgitation nozzle touches air is short, it is hard coming to generate the non-regurgitation and a kink. That is, discharging of an ink jet head can be stabilized, a defect's generating can be lessened, and the manufacturing installation of a color filter whose yield improved can be offered.

[0184] Moreover, as shown in drawing 21 and drawing 22 , even if it is the case where it is the ink jet head by which the nozzle has been arranged, the same effectiveness is acquired by performing the same regurgitation control as this operation gestalt.

[0185] Moreover, although it was the case where one screen was colored by scanning 3 times, in drawing 23 and drawing 24 , it may not limit to this and you may be 4 times or more. It is effective when especially little three scan or more colors by the case where the area which can be colored especially by one scan does not fulfill 1 for an integer of one screen slightly.

[0186] (5th operation gestalt) The nozzle shall be arranged at intervals of 70.5 micrometers, and the ink jet head used with this 5th operation gestalt shall lean a nozzle train to a scanning direction, for example, shall color the pixel of the same color with the nozzle of every six nozzles. Moreover, the color pattern of the color filter manufactured with the equipment of this operation gestalt is the same as that of what was shown in drawing 9 .

[0187] Drawing 25 is drawing having shown the configuration of the manufacturing installation of the color filter of the 5th operation gestalt. 301 is a drawing image (array pattern of the pixel of a color filter), and is data in which the relative-position relation of each ink dot which should be formed on a substrate 1 is shown. 302 is a nozzle change signal and directs each point of the pixel of a color filter, and the change of a corresponding nozzle. In addition, although it is easy 3, the 8 or 13th nozzle group, and for the degree to make the degree passing <a thing> on with 4 and the 9 or 14th nozzle group further supposing it will count from the right first and will use 2 and the 7 or 12th nozzle group, if the concrete approach of a change of a nozzle group is explained using drawing 25 and drawing 1 , it does not matter by other approaches. Moreover, the change of a nozzle group shall be performed one by one, when the life of the nozzle which is carrying out current use comes. When the life of a nozzle is judged based on the time of one nozzle group and the time of one nozzle group reaches predetermined time, it judges with the life having come. 303 is drawing data generation equipment and generates the drawing data on the substrate of each ink dot which are data of a location absolutely by performing correlation of each pixel on a substrate and a nozzle according to the nozzle change signal 302. Under the present circumstances, if a nozzle is changed, in connection with it, change of the location of the nozzle before and behind a change will be calculated from the known data about a nozzle configuration, and only that part will change the location of the stage 308 at the time of each ink dot formation before and behind a nozzle change. 304 is a driver and forms the ink dot as drawing data on a substrate 1 by driving the ink jet head 305 and a feed gear 306,307 according to drawing data. 305 is an ink jet head and is equipped with red head 305a which carries out the regurgitation of the red ink, green head 305b which carries out the regurgitation of the green ink, and blue head 305c which carries out the regurgitation of the blue ink. 306,307 is a feed gear and moves the location of a stage 308 in the direction of X, and the direction of Y according to the signal

from a driver 304, respectively. 308 is a stage and holds the substrate 1 colored. The drawing pattern 310 according to the drawing image 301 is generated on a substrate 1 by the above-mentioned configuration. [0188] In addition, although the change of the physical relationship of the substrate which a nozzle location shifts and is equivalent to an amount, and a plotting head accompanying a nozzle change is presumed from the known data about the nozzle configuration of a nozzle with this operation gestalt, the physical relationship of the ink dot actually formed of each nozzle may be measured with an image processing system etc.

[0189] Moreover, as actual configuration, the nozzle switch signal 302 and drawing data generation equipment 303 are realized in many cases as a function of one set or two or more computers which were connected.

[0190] The means which changes the nozzle group use it is equivalent to a nozzle change signal 302 and drawing data generation equipment 303, and a means to by which that substrate 1 (a pixel) that shifts and is equivalent to an amount, and a means presume or measure change of the physical relationship of the nozzle of an ink-jet head change the physical relationship of drawing data generation equipment 303 and a substrate 1, and an ink-jet head (a nozzle) is equivalent to drawing data generation equipment 303, a driver 304, and a feed gear 306,307 in this operation gestalt.

[0191] (6th operation gestalt) Next, drawing 26 is drawing having shown the configuration of the manufacturing installation of the color filter of the 6th operation gestalt. With the 5th operation gestalt, to having performed detection and a nozzle change of a defect nozzle from the outside, it calculates with the count count equipment 311 of the regurgitation by calculating the count of the regurgitation of each nozzle from a time and the count of the regurgitation per unit time amount, a defect nozzle is presumed, and a nozzle is changed by this operation gestalt.

[0192] In addition, although the defect nozzle is presumed with this operation gestalt by calculating the count of the regurgitation of each nozzle from a time and the count of the regurgitation per unit time amount, the approach of measuring the count of the regurgitation directly, and how an image processing system etc. detects a defect nozzle from the condition of an ink dot may be used.

[0193] Moreover, with this operation gestalt, as compared with the 5th operation gestalt, since the change of a nozzle is performed automatically, it is effective in the time amount in which continuous running is [ that laborsaving is easy and ] possible being long.

(7th operation gestalt) Next, drawing 27 is drawing having shown the configuration of the manufacturing installation of the color filter of the 7th operation gestalt. With this operation gestalt, the temperature distribution of each nozzle of an ink jet head head are measured, and a nozzle is changed according to it.

[0194] in addition, in the manufacturing installation of a color filter, since the array of the ink dot drawn is the same each time, in the temperature change of a nozzle in use serving as a pattern of about 1 law, temperature environments, such as outside air temperature, are also about 1 laws in many cases. Therefore, it is possible to presume the temperature of each nozzle by the time amount from the beginning of using. Then, although the temperature of each nozzle is actually measured and the nozzle is changed with this operation gestalt, temperature is not measured directly but the almost same effectiveness is acquired also by the approach of changing a nozzle for every fixed time amount.

[0195] Moreover, with the above-mentioned operation gestalt, since the temperature rise of each nozzle is controlled, there are effectiveness of preventing the poor regurgitation by burn of ink etc., and effectiveness that a life is prolonged since the quiescent time is given after fixed operation time about

each nozzle.

[0196] In addition, in the above-mentioned operation gestalt, although the case where the black matrix 2 was formed on a glass substrate 1 was explained, the black matrix 2 is not limited when formed on a glass substrate 1, and may be formed in another [ which counters ] substrate side in drawing 3 . In this case, ink is made to breathe out so that it may enter within the limit of the part 5 by which drawing 1 is not formed into parent ink.

[0197] Furthermore, in the above-mentioned operation gestalt, although the ink jet head of the Bubble Jet which the ink jet on a heater 102 boils an ink jet head, air bubbles are generated, and ink is extruded by the cubical expansion of these air bubbles from a delivery 108, and carries out the regurgitation was used, this invention may not be limited to this and may be an ink jet head using a piezo-electric element.

[0198] Although especially this invention explained the printing equipment of the method which it has [ method ] means (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used in order to make the ink regurgitation perform, and makes the change of state of ink occur with said heat energy also in an ink jet recording method, according to this method, it can attain the densification of record, and highly minute-ization.

[0199] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports recording information and exceeds film boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by 1 to 1 as a result, it is effective. A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If the shape of a pulse form is carried out, since growth contraction of air bubbles will be appropriately performed instantly in this driving signal, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable.

[0200] As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0201] The configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which a delivery which is indicated by each above-mentioned specification, a liquid route, and the heat operating surface other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of an electric thermal-conversion object are crooked as a configuration of a recording head is also included in this invention. In addition, it is good also as a configuration based on JP,59-138461,A which indicates the configuration whose opening which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which uses a common slot as the discharge part of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part.



[0202] Furthermore, any of the configuration which fills the die length with the combination of two or more recording heads which are indicated by the specification mentioned above as a recording head of the full line type which has the die length corresponding to the width of face of the maximum record medium which can record a recording device, and the configuration as one recording head formed in one are sufficient.

[0203] In addition, the recording head of the exchangeable chip type with which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained, or the recording head of the cartridge type with which the ink tank was formed in the recording head itself in one may be used by the body of equipment being equipped.

[0204] Moreover, since effectiveness of this invention is further made to stability, it is desirable to add the recovery means against a recording head established as a configuration of the recording device of this invention, a preliminary auxiliary means, etc. If these are mentioned concretely, it is effective in order to perform record stabilized by performing the preheating means by the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a recording head, and reserve regurgitation mode in which the regurgitation different from record is performed.

[0205] In this invention operation gestalt explained above, although ink is explained as a liquid, even if it is ink solidified less than [ a room temperature or it ], what is softened or liquefied at a room temperature may be used, and ink should just make the shape of liquid at the time of use record signal grant.

[0206] In addition, in order to prevent positively by making the temperature up by heat energy use it positively as energy of the change of state from a solid condition to the liquid condition of ink, or in order to prevent evaporation of ink, the ink which solidifies in the state of neglect and is liquefied with heating may be used. Anyway, ink liquefies by grant according to the record signal of heat energy, and this invention can be applied also when using the ink of the property which will not be liquefied without grant of heat energy, such as that by which liquefied ink is breathed out, and a thing which it already begins to solidify when reaching a record medium. In such a case, ink is good for a porosity sheet crevice or a through tube which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0207]

[Effect of the Invention] Since according to this invention what is used for a common printer in the ink jet head used in case a color filter is manufactured is used, or easy reconstruction can be carried out and it can be used as explained above, the cost of an ink jet head is lowered, cost concerning a manufacturing installation can be made cheaper and the manufacturing cost per color filter can be lowered further.

[0208] Moreover, since the amount of the ink for color filters used for per sheet can be reduced, equipment equipped with a cheaper color filter, the display using this color filter, and this display can be offered.

[0209] Moreover, the manufacturing installation and the manufacture approach of a color filter that the color filter of low cost is more nearly producible can be offered by shortening the coloring time amount which discharging of an ink jet head is stabilized when the scan of multiple times colors one glass substrate, and can lessen a defect's generating, and one glass substrate takes, and increasing the volume per unit time amount.



[0210] Moreover, by shortening the quiescent time to which the regurgitation nozzle of the ink jet head between scans does not carry out the regurgitation of the ink, when the relative scan of multiple times colors one substrate for the ink jet head arranged so that a regurgitation nozzle might be in agreement with a pixel pitch, discharging of an ink jet head can be stabilized, a defect's generating can be lessened, and the manufacturing installation of the color filter whose yield improved can be offered.

[0211] Moreover, even if it becomes possible to change the nozzle used in an ink jet head and fault occurs for a nozzle in use, it becomes possible to continue manufacture of a color filter by other nozzles.

[0212] Moreover, the exchange frequency of an ink jet head decreases from the life of an ink jet head being prolonged rather than the conventional color filter.

[0213] Moreover, the magnitude of an ink dot and the thickness of a color are kept constant. Moreover, in this invention, there are effectiveness of preventing the poor regurgitation by burn of ink etc. by the temperature rise of each nozzle being controlled, and effectiveness that the nozzle life by the quiescent time being given after fixed operation time is prolonged about each nozzle.

[0214]

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[Translation done.]

**\* NOTICES \***

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is drawing showing the relation between the color filter in a color filter manufacturing installation, and an ink jet head.

[Drawing 2] It is drawing explaining the production process of a color filter.

[Drawing 3] It is drawing showing other examples of the production process of a color filter.

[Drawing 4] It is the sectional view showing the structure when building into a TFT-liquid-crystal panel the color filter manufactured by the manufacturing installation of an operation gestalt.

[Drawing 5] It is the sectional view showing the structure when building into a TFT-liquid-crystal panel the color filter manufactured by the manufacturing installation of an operation gestalt.

[Drawing 6] It is the block diagram having shown the information processor with which a liquid crystal panel is used.

[Drawing 7] It is drawing having shown the information processor with which a liquid crystal panel is used.

[Drawing 8] It is drawing having shown the information processor with which a liquid crystal panel is used.

[Drawing 9] It is drawing showing the pattern of the color filter manufactured by the manufacturing installation of an operation gestalt.

[Drawing 10] It is drawing showing the size of the display when including in the TFT-liquid-crystal panel of the color filter manufactured by the manufacturing installation of an operation gestalt.

[Drawing 11] It is drawing showing the structure of an ink jet head.

[Drawing 12] It is drawing showing the configuration of the recovery system unit of the manufacturing installation of an operation gestalt.

[Drawing 13] The recovery system unit of the manufacturing installation of an operation gestalt is drawing showing the condition of carrying out capping.

[Drawing 14] The recovery system unit of the manufacturing installation of an operation gestalt is drawing showing the condition of carrying out wiping.

[Drawing 15] It is drawing showing the structure of an ink jet head.

[Drawing 16] It is the block diagram showing the outline configuration of the manufacturing installation of an operation gestalt.

[Drawing 17] It is the flow chart which shows actuation of the outline of the manufacturing installation of an operation gestalt.

[Drawing 18] In the manufacturing installation of an operation gestalt, it is drawing in which relative displacement of an ink jet head to a glass substrate carrying out, and showing a way.

[Drawing 19] In the manufacturing installation of an operation gestalt, it is drawing having shown the physical relationship of a pixel and a regurgitation nozzle.

[Drawing 20] It is drawing showing the method of the regurgitation of an ink jet head.

[Drawing 21] It is drawing showing arrangement of the regurgitation nozzle of the nozzle side of an ink jet head.

[Drawing 22] It is drawing showing arrangement of the regurgitation nozzle of the nozzle side of an ink jet head.

[Drawing 23] In the manufacturing installation of an operation gestalt, it is drawing in which relative displacement of the ink jet to a glass substrate carrying out, and showing a way.

[Drawing 24] In the manufacturing installation of an operation gestalt, it is drawing in which relative displacement of the ink jet to a glass substrate carrying out, and showing a way.

[Drawing 25] It is drawing having shown the configuration of the manufacturing installation of the color filter of the 5th operation gestalt.

[Drawing 26] It is drawing having shown the configuration of the manufacturing installation of the color filter of the 6th operation gestalt.

[Drawing 27] It is drawing having shown the configuration of the manufacturing installation of the color filter of the 7th operation gestalt.

[Description of Notations]

1 Glass Substrate

2 Black Matrix

3 Resin Constituent

4 Mask

5 Part Which is not Formed into Parent Ink

6 Part Formed into Parent Ink

7 Ink

8 Protective Coat

22 X-Y Stage

30 Recovery System Unit

31 Cap

31 Blade

108 Regurgitation Nozzle

120a Ink jet head (R)

120b Ink jet head (G)

120c Ink jet head (B)

IJH Ink jet head